UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/988,688	11/20/2001	Tsunenobu Hori	11-073	9032

23400 7590 08/11/2006

POSZ LAW GROUP, PLC
12040 SOUTH LAKES DRIVE
SUITE 101
RESTON, VA 20191

EXAMINER	
PERRY, ANTHONY T	

ART UNIT	PAPER NUMBER
2879	

DATE MAILED: 08/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/988,688	HORI	
	Examiner	Art Unit	
	Anthony T. Perry	2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 May 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8,10-13,15,17,18,20 and 22-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8,10-13,15,17,18,20 and 22-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

The Amendment filed on 5/30/2006, has been entered and acknowledged by the Examiner.

New claims 23-32 have been added.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 32 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The recitation, "the predetermined number decreased to increase the joint strength of the laser fuse weld," is unclear. What is the predetermined number to start with, and what is it decreased down to? In order to examine the claim on its merits, the examiner has interpreted claim 32 to read, --A spark plug as set forth in claim 23, wherein the laser fused weld includes a predetermined number of fused portions.--

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 2, 3, 10, 15, 17, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over McDougal (US2,783,409) in view of Johnson (US 5,430,346) and further in view of Kanao (DE 199 61 768 A 1).

Regarding claims 1 and 3, Johnson teaches a spark plug comprising a metal shell (6) and a center electrode (16) within and insulated from said metal shell (6). McDougal teaches that a ground electrode extend horizontally from the metal shell (6) and opposes an outer peripheral surface of the center electrode defining a spark gap there between (for example, see Fig. 1). The ground electrode (8) has a second tip end facing the outer peripheral surface of the center electrode (16) substantially along a line extending perpendicular to the longitudinal center line fo the center electrode and intersecting the outer peripheral surface. McDougal does not specifically teach a laser weld material connecting the ground electrode to the metal shell.

However, Johnson teaches the ground electrode being directly connected to the metal shell through a laser fused welding material (col. 4, lines 42-50). It is well known in the art, that laser welding eliminates the necessity of tightly pressing the objects to be welded together, protecting them from unfavorable deformation. Also, laser welding provides a well-alloyed zone (molten zone) with minimum recrystallization forming a strong bond. Accordingly, it would have been obvious at the time the invention was made to a person having ordinary skills in the art to use laser welding to attach the ground electrode to the metal shell of Pfeil so that the ground electrode and the metal shell are sufficiently molten due to the high density of its energy, producing a spark plug with a strong bond between its ground electrode and shell while also protecting the components from unfavorable deformation. It is inherent that there will be "a predetermined melt depth" in the combined invention.

McDougal and Johnson do not specifically teach a predetermined melt depth of about 0.3 to 1.5 mm. However, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a workable range for the welding depth so that ground electrode stays secured to metal shell throughout the use of the spark plug, since optimization of workable ranges is considered within the skill of the art. Furthermore, Kanao disclose values for a laser welding melt depth between a noble metal and a non-noble metal that provide the best tensile strength (see for example Fig. 8). Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a melt depth of 0.3 mm for the laser fuse weld of the ground electrode and metal shell, since Kanao teaches that such a melt depth provides the highest tensile strength.

Regarding claims 2 and 10, Johnson teaches the whole of the ground electrode being made of an alloy (col. 5, line 68 – col. 6, line 3). Johnson teaches the ground electrode being connected at an end thereof directly though a laser fused weld to the metal shell (col. 4, lines 42-50).

Reasons for combination given in the rejection of claim 1 apply.

Regarding claim 15, Johnson teaches the tip portion (65) of the center electrode (18b) being made of a Ir alloy (see Fig. 26 and col. 5, lines 54-58).

Reasons for combination given in the rejection of claim 1 apply.

Regarding claim 17, McDougal teaches the tip portion (22) of the center electrode (16) being made of a Pt alloy (col. 2, lines 18-42).

Regarding claim 22, McDougal discloses the ground electrode extending directly from the metal shell in a direction perpendicular to the longitudinal center line of the center electrode.

Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over McDougal (US 2,783,409) in view of Johnson (US 5,430,346) in view of Kanao (DE 199 61 768 A 1) as applied to claim 1 above, and further in view of Takafumi et al. (JP 63-266046).

Regarding claims 4-5, Johnson, McDougal, and Kanao fail to specifically teach the composition of the metal shell. However, Takafumi teaches a composition of a metal shell for a spark plug that is made of an Fe-based alloy containing 0.15% by weight or less of S, 0.35% by weight or less of Si, 0.25% by weight or less of C, 1.5% by weight or less of Mn, and 0.1% by weight or less of P (see abstract). This composition provides a metal shell with excellent tensile strength (see abstract). Accordingly one of ordinary skill in the art at the time the invention was made would have found it obvious to have the metal shell with the above composition, as taught by Takafumi, so as to provide a spark plug with a metal shell having excellent tensile strength.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over McDougal (US2,783,409) in view of Johnson (US 5,430,346) in view of Kanao (DE 199 61 768 A 1) as applied to claim 1, above, and further in view of Pfeil (US 2,406,966).

Regarding claim 6, McDougal states that the ground electrode may be made of any platinum rich metal alloy and that noble metals can be used as the ground electrode (col. 2, lines 18-42), but does not specifically state that the platinum content is more than 50% and that Ir specifically is included in the alloy. However, Pfeil teaches that it is common to use a platinum-iridium alloy containing 80% Pt and 20% Ir as the ground electrodes of spark plugs (col. 1, lines 3-7). It has been held to be within the general skill of a worker in the art to select a known

material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416. Thus, it would have been obvious to one having ordinary skills in the art at the time the invention was made to have used a ground electrode containing 80% platinum and 20% iridium, since the selection of known materials for a known purpose is within the skill of the art.

Claim 7, 8, 13, 18, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over McDougal (US 2,783,409) in view of Johnson (US 5,430,346) in view of Kanao (DE 199 61 768 A 1) as applied to claim 1 above, and further in view of Franks (US 3,958,144).

Regarding claim 7, McDougal, Johnson, and Kanao fail to specifically teach the ground electrode being made of 50 wt% or more of Ir. However, the Franks reference teaches that spark plugs having a ground electrode composed of more than 60 wt% of iridium with an additive of nickel produce a sparking operation considerably improved over previous spark plugs (col. 1, lines 44-64). Accordingly one of ordinary skill in the art would have found it obvious at the time the invention was made to use the ground electrode comprising of 60wt% of iridium with an additive of nickel, in place of the ground electrode taught by Johnson, so as to provide a spark plug with an improved sparking operation.

Regarding claims 8 and 13, McDougal, Johnson, and Kanao do not specifically teach the ground electrode being made of an Ir alloy containing a main component of 50wt% or more of Ir.

However, the Franks reference teaches that spark plugs having a ground electrode composed of more than 60 wt% of iridium with an additive of nickel produce a sparking operation considerably improved over previous spark plugs (col. 1, lines 44-64). Accordingly one of ordinary skill in the art would have found it obvious at the time the invention was made to

make ground electrode of 60 wt% of iridium with an additive of nickel in order to provide the spark plug with an improved sparking operation.

Regarding claim 10, as stated in the rejection of claim 1, above, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a workable range for the welding depth so that ground electrode stays secured to metal shell throughout the use of the spark plug, since optimization of workable ranges is considered within the skill of the art. Furthermore, Kanao disclose values for a laser welding melt depth between a noble metal and a non-noble metal that provide the best tensile strength (see for example Fig. 8). Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a melt depth of 0.3 mm for the laser fuse weld of the ground electrode and metal shell, since Kanao teaches that such a melt depth provides the highest tensile strength.

Regarding claim 18, Johnson teaches the tip portion (65) of the center electrode (18b) being made of a Ir alloy (see Fig. 26 and col. 5, lines 54-58).

Reasons for combination given in the rejection of claim 1 apply.

Regarding claim 20, McDougal teaches the tip portion (22) of the center electrode (16) being made of a Pt alloy (col. 2, lines 18-42).

Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over McDougal (US 2,783,409) in view of Johnson (US 5,430,346) in view of Kanao (DE 199 61 768 A 1) in view of Franks (US 3,958,144) as applied to claim 8 above, and further in view of Takafumi et al. (JP 63-266046).

Regarding claims 11-12, Johnson, McDougal, Kanao, and Franks fail to specifically teach the composition of the metal shell. However, Takafumi teaches a composition of a metal shell for a spark plug that is made of an Fe-based alloy containing 0.15% by weight or less of S, 0.35% by weight or less of Si, 0.25% by weight or less of C, 1.5% by weight or less of Mn, and 0.1% by weight or less of P (see abstract). This composition provides a metal shell with excellent tensile strength (see abstract). Accordingly one of ordinary skill in the art at the time the invention was made would have found it obvious to have the metal shell with the above composition, as taught by Takafumi, so as to provide a spark plug with a metal shell having excellent tensile strength.

Claims 23-24, 27, 30, 31, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pfeil (US 2,406,966) in view of Johnson (US 5,430,346) and further in view of Kanao (DE 199 61 768 A 1).

Regarding claims 23, 24, 27, 30, and 31, Fig. 4 of the Pfeil reference shows a spark plug comprising a metal shell (10), a center electrode (5) retained in the metal shell and insulated from the metal shell, and a ground electrode (8) extending directly from the metal shell in a horizontal direction which is perpendicular to the longitudinal center line of the center electrode (5) so that it is opposed to the first tip end of the center electrode. The ground electrode is welded at an end thereof directly to the metal shell. Pfeil teaches that electrodes are commonly made of a platinum-iridium alloy having 80% platinum and 20% iridium (col. 1, lines 3-7) and that the ground electrode is connected directly to the metal shell by a welding material. Pfeil does not specifically teach the weld material being a laser fused weld.

However, Johnson teaches the ground electrode being directly connected to the metal shell through a laser fused welding material (col. 4, lines 42-50). It is well known in the art, that laser welding eliminates the necessity of tightly pressing the objects to be welded together, protecting them from unfavorable deformation. Also, laser welding provides a well-alloyed zone (molten zone) with minimum recrystallization forming a strong bond. Accordingly, it would have been obvious at the time the invention was made to a person having ordinary skills in the art to use laser welding to attach the ground electrode to the metal shell of Pfeil so that the ground electrode and the metal shell are sufficiently molten due to the high density of its energy, producing a spark plug with a strong bond between its ground electrode and shell while also protecting the components from unfavorable deformation. Since the laser fused weld of the combined invention is at a point where the ground electrode is connected to the metal shell, it is considered to be far from the second end tip that faces the center electrode such that it avoids a rise in temperature of the weld. It is inherent that there will be "a predetermined melt depth" in the combined invention.

Pfeil and Johnson do not specifically teach a predetermined melt depth of about 0.3 to 1.5 mm. However, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a workable range for the welding depth so that ground electrode stays secured to metal shell throughout the use of the spark plug, since optimization of workable ranges is considered within the skill of the art. Furthermore, Kanao disclose values for a laser welding melt depth between a noble metal and a non-noble metal that provide the best tensile strength

(see for example Fig. 8). Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a melt depth of 0.3 mm for the laser fuse weld of the ground electrode and metal shell, since Kanao teaches that such a melt depth provides the highest tensile strength.

Regarding claim 32, it is inherent that the laser fused weld includes a predetermined number of fused portions (note that a single fused weld satisfies this limitation). Furthermore, Kanao teaches more than one fused weld portion (see for example, Fig. 2B).

The reasons for combination given in the rejection of claim 23, apply.

Claims 25-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pfeil (US 2,406,966) in view of Johnson (US 5,430,346) in view of Kanao (DE 199 61 768 A 1) as applied to claim 23 above, and further in view of Takafumi et al. (JP 63-266046).

Regarding claims 25-26, Johnson, Pfeil, and Kanao fail to specifically teach the composition of the metal shell. However, Takafumi teaches a composition of a metal shell for a spark plug that is made of an Fe-based alloy containing 0.15% by weight or less of S, 0.35% by weight or less of Si, 0.25% by weight or less of C, 1.5% by weight or less of Mn, and 0.1% by weight or less of P (see abstract). This composition provides a metal shell with excellent tensile strength (see abstract). Accordingly one of ordinary skill in the art at the time the invention was made would have found it obvious to have the metal shell with the above composition, as taught by Takafumi, so as to provide a spark plug with a metal shell having excellent tensile strength.

Claims 28-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pfeil (US 2,406,966) in view of Johnson (US 5,430,346) in view of Kanao (DE 199 61 768 A 1) as applied to claim 23 above, and further in view of Franks (US 3,958,144).

Regarding claims 28-29, the combined invention teaches the ground electrode being connected directly to the metal shell. Pfeil, Johnson, and Kanao fail to specifically teach the ground electrode being made of 50 wt% or more of Ir. However, the Franks reference teaches that spark plugs having a ground electrode composed of more than 60 wt% of iridium with an additive of nickel produce a sparking operation considerably improved over previous spark plugs (col. 1, lines 44-64). Accordingly one of ordinary skill in the art would have found it obvious at the time the invention was made to use the ground electrode comprising of 60wt% of iridium with an additive of nickel, in place of the ground electrode taught by Johnson, so as to provide a spark plug with an improved sparking operation.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Response to Arguments

Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to *Anthony Perry* whose telephone number is **(571) 272-2459**. The examiner can normally be reached between the hours of 9:00AM to 5:30PM Monday thru Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel, can be reached on (571) 272-2457. **The fax phone number for this Group is (571) 273-8300.**

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Anthony Perry
Patent Examiner
Art Unit 2879
August 6, 2006

NIMESHKUMAR D. PATEL
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800